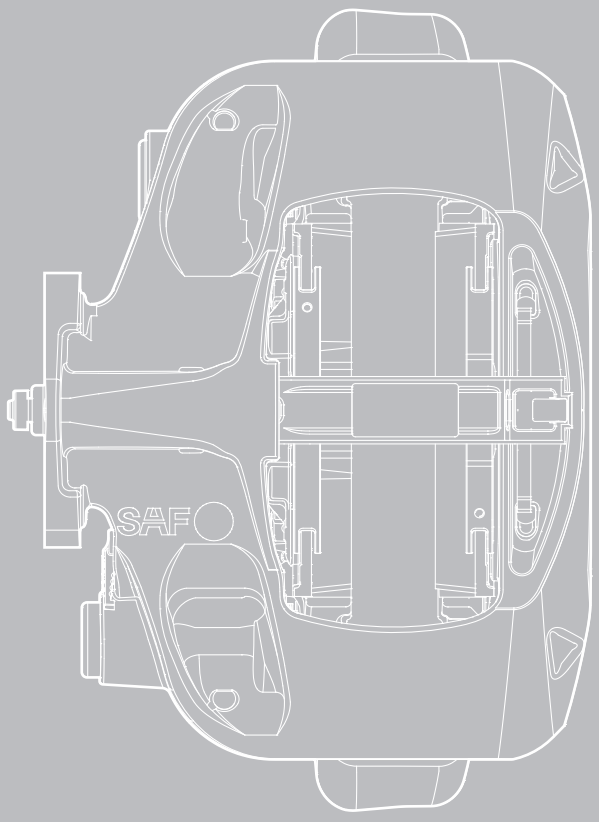
SAF-HOLLAND Group

Repair Instructions

Compressed Air Disc Brake
SAF SBS 2220 H0



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1 Introduction

1.1 General Information

The SAF SBS 2220 H0 repair instructions are divided up into chapters. The sequence of the chapters is structured in such a way as to make the instructions easy for the user to read and simple to follow.

Chapter "1. Introduction" provides a general overview of these repair instructions and the SAF SBS 2220 H0 compressed air disc brake.

It is important to carefully read chapter "2. Safety Precautions" before starting any workshop procedures. This is to inform the user about the safety measures and the potentially hazardous situations which, if not avoided, could result in serious injury or death!

Chapter "3. Initial and Final Procedures" describes the start and finish activities necessary to be able to carry out inspection and replacement work. It also describes the function test for the SAF SBS 2220 H0 compressed air disc brake.

Consult chapter "4. Inspection Procedures" for information and instructions on inspecting the SAF SBS 2220 H0 compressed air disc brake. Chapter "4.2. Inspection Intervals" is useful for the recommended compressed air disc brake inspection intervals. Here the Inspection Intervals table displays how frequently the different brake components shall be inspected and on which pages the check instructions are to be found.

If any inspection shows that a replacement activity needs to be performed, continue to the appropriate section in chapter "5. Replacement Procedures".

Chapter "6. Specifications" contains technical data for the SAF SBS 2220 H0 compressed air disc brake.

Chapter "7. Tools" contains information about the SAF SBS 2220 H0 Tool Kit, which is essential for carrying out much of the replacement procedure work described in this manual.

Chapter "8. Fault Finding" should be used to help with the self diagnosis of any problem being experienced.

Finally Chapter "9. Components List" lists and shows what spare part components are available for SAF SBS 2220 H0 compressed air disc brake.

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1.1.1 Spare Parts

It is vital that only SAF-HOLLAND original spare parts are used during all service replacement activities.

The use of non-original spare parts can affect the function, performance and/or service life of the parts.

The use of non-original spare parts will immediately terminate any warranty of the disc brake unit.

1.2 Functional Description

The SAF SBS2220 H0 contains a floating monobloc calliper –item C– and an integrated adjustment unit which compensates for brake pad wear.

The unit, which is actuated by the mechanism lever –item A– presses the inner brake pad –item B– against the disc, which then causes the calliper –item C–to slide laterally. As such, the outer brake pad –item D– also comes into contact with the disc.

The calliper moves on slide pins –item E– (see. Where the disc brake also serves as a parking brake, the unit is actuated by a spring brake chamber –item F–.

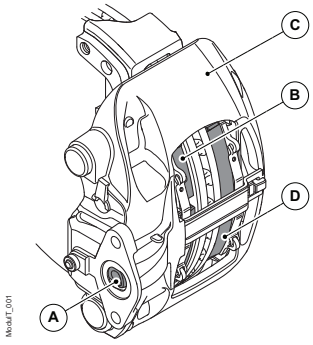

Fig. 1 · Functional Description

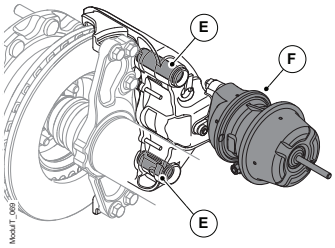

Fig. 2 · Slide pins and spring brake chamber

2 Safety Precautions

2.1 General Information

This chapter comprehends the Safety Precautions that shall be read and followed before any Inspection/Removal/ Installation procedure described in these repair instructions is started. These repair instructions are intended for the exclusive use of trained persons within the commercial vehicle industry and related workshops.

Three different alert levels are used throughout these repair instructions:

- **Danger,**
- **Careful** and
- Note.

The following symbols are used to denote particularly important information and sections of the text. Make sure that they are always read and adhered to before working with the product.

Danger!

This safety instruction with the exclamation mark warns of a possible safety risk or serious and fatal injuries.

Careful!

This safety instruction with the exclamation mark warns of possible damage to the product.

Note:

Marking for special user tips and other particularly useful and important information for efficient work and economical use.

2.2 Installation

The disc brake must not be installed or treated in such a way that exposes it to excessive thermal, mechanical or chemical influences that can cause a reduced braking effect or damage to vital components in the brakes. These influences/damages may result in a shortened service life for the disc brake and its components, reduced brake effect or at worst total brake failure.

2.3 Adjustment of Control System/Valves

Failure to follow the instructions in this chapter may accelerate the wear to the brake pads and may cause damage/ repeated damage to the disc brake, axle and/or wheel brake components.

2.3.1 Before entering the Vehicle into service

Prior to initial use, a vehicle's disc brake compressed air brake unit must be checked and adjusted (if necessary) in accordance with the relevant brake calculations. Contact the vehicle manufacturer for relevant information.

2.3.2 Replacing Spare Parts

Always use spare parts that are approved for the vehicle, axle or disc brake. Following replacement of any essential components or spare parts in the disc brake operating system (such as brake valves or control units), the disc brake operating system must also be checked and adjusted (if necessary) in accordance with the relevant braking calculations.

2.3.3 Brake Force Distribution

It is very important that the distribution of brake force, between axles/vehicles, in a vehicle combination is adapted so that the brake force for each axle/vehicle is proportioned in accordance with the legally applied braking calculations.

If the brake force is not correctly distributed it can lead to excessive braking of a vehicle and/or one or more axles in the combination. This can result in overheating, accelerated wear and damage to the disc brake, pads, discs, tyres and wheel components.

Before a vehicle is entered into service it must be set up according to the specified values in the relevant brake calculations. After the pads/brake discs have been run in for a period of around 3,000-5,000 km the brake force distribution between the truck/tractor and trailer may require adjustment. Brake adjustment must also be carried out during repairs/changing spare parts when heating/overheating has suspected to damaged the axle/brake components (e.g. seals, hub/wheel bearings and brake disc).

Contact the vehicle supplier for information on the appropriate action.

Following replacement of any essential components or spare parts in the disc brake operating system (e.g. brake valves or control units), the disc brake operating system must also be checked and adjusted in accordance with the relevant braking calculations.

Failure to follow these instructions may cause damage/repeated damage to the disc brake, axle and/or wheel brake components.

2.4 Brake Chamber

Moisture/water ingress into the disc brake's mechanism housing will potentially affect the function of the disc brake and as a result shorten its life.

Therefore, to prevent water ingress it is important that the disc brake chamber is of the correct design and that the seal between the brake chamber and disc brake mating surface is undamaged correctly in place.

It is also important for the disc brake's function that the brake chamber housing is correctly ventilated.

As a minimum, the drain holes facing downwards must be open, see Fig. 3. Other drain plugs can remain in position in the brake chamber housing.

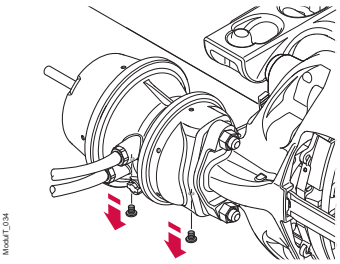

Fig. 3 · Brake chamber ventilation

Careful!

If all the plugs remain fitted, the brake chamber and disc brake will not operate correctly.

2.5 Recycling

When replacing the disc brake or parts thereof, the components removed must be recycled/destroyed in compliance with applicable environmental legislation, regulations and provisions.

2.6 Cleaning

For the disc brake to function correctly it is important to ensure it is kept clean and that its normal movements are not restricted by mud, ice, snow, objects, etc. Damage may cause direct brake failure or damp/dirt penetration resulting in malfunction/shortening of the service life of the disc brake.

Careful!

It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.

2.7 Surface finishing for Disc Brake

2.7.1 Painting

The disc brake can be finished with paint that has trade approval for this purpose (automotive paint). Care must be taken to ensure that the paint layer does not cause damage and/or restrict the natural movement or operation of the disc brake. All contact surfaces, friction and rubber parts must therefore be protected or masked.

The following areas must not be painted:

- bellows,
- reset shaft and its protection plug,
- complete brake pads,
- disc surface,
- the disc brake mounting surfaces to axle/brake chamber and
- all bolted connections.

2.7.2 Shot-blasting

Careful!

Failure to follow the instructions below could compromise safety and/or reduce the life of the disc brake and its components.

If the vehicle is shot blasted, all rubber parts and pads on the disc brake must be protected. The brake chamber must be fitted (or any protective parts that have a similar sealing function). The shipping seal fitted to the brake chamber opening on a new disc brake does not provide adequate protection during shot-blasting.

Note:

Do not forget to follow the recommendations of the brake chamber manufacturer.

The disc brake must be thoroughly cleaned after blasting to ensure that its natural movement is not obstructed by remnants of shot-blasting material. Check the seals/rubber parts to make sure they have not been damaged. Also refer to the axle manufacturer's instructions.

3 Initial and Final Procedures

3.1 General Information

The objective of this chapter is to give guidelines on how Initial and Final Procedures shall be performed in a standardised way.

Initial Procedure is a recurring procedure that have to be performed prior to the Inspection and/or Replacement procedures covered in this Service Manual.

Final Procedure is a recurring procedure that have to be performed after an Inspection and/or Replacement procedure covered in this Service Manual.

3.2 Initial Procedure

3.2.1 Lift up and support the vehicle axle

Danger!

- **At least one of the vehicle´s axles shall be chocked to prevent involuntary movement of the vehicle!**
- **The vehicle manufacturer´s safety precautions shall be followed when working on the vehicle!**
- **Local safety precautions must be observed!**

1. On a flat and even surface, block the wheels, see Fig. 4
2. Lift the axles and place on stands.

Danger!

If the disc brake is equipped with a parking brake function, ensure that the brake system is depressurised, that the spring brake chamber is fully disengaged and mechanically secured in the released position. See the vehicle manufacturer's instructions.

3. Release the parking brake

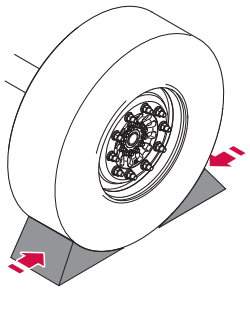

Fig. 4 · Block the wheels

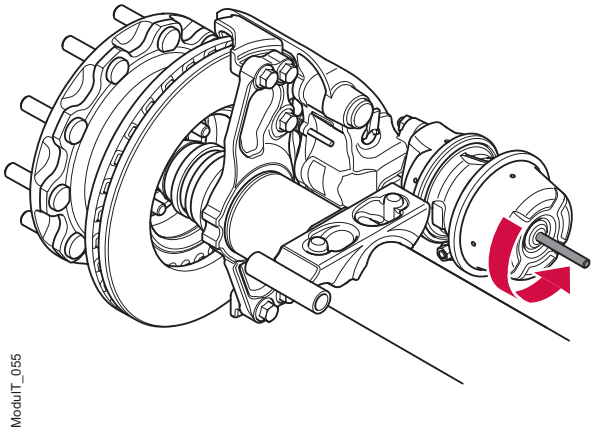

Fig. 5 · Mechanically secure in released position

3.2.2 Removing the wheel

Danger!

- **Take all necessary safety precautions before wheel removal!**
- **The vehicle manufacturer´s safety precautions must be followed!**

1. Check the free rolling resistance. If the resistance is higher than expected, tap the tyre to remove any normal rest tension. If the wheel still does not rotate freely then consult chapter "8. Fault Finding" to assist further.
2. Remove the wheel nuts followed by the wheel, see Fig. 6.

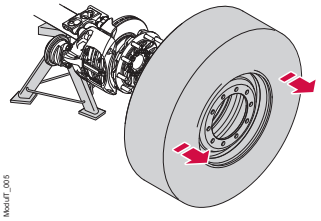

Fig. 6 · Removing the wheel

3.3 Function Test

3.3.1 Check of Adjustment Unit

Note:

The function test can be carried out with the wheel both fitted or removed.

1. Check that the wheel/hub can rotate freely. If it does not then first tap to remove any rest tension. If the wheel still does not rotate freely then consult chapter "8. Fault Finding" to assist further.
2. Remove the reset shaft protection plug –item A–, see Fig. 7.

Careful!

- **Use recommended tools only!**
- **Never use an impact wrench or similar to turn the reset shaft. This may damage internal parts of the mechanism! Torque is 20 Nm max.**

Note:

The Torx 55 and the Thrust plate must be allowed to move unhindered!

3. Using a Torx 55 socket, de-adjust the brake by turning the reset shaft anti-clockwise by 4 clicks, or till the end stop, see –item B–, see Fig. 7. A clicking sound shall be heard and felt when retracting.

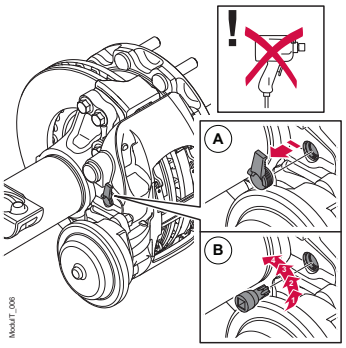

Fig. 7 · De-adjustment via the reset shaft

Careful!

- **When reaching the end stop position of de-adjustment, never tighten and leave. Leaving the reset shaft tightened in the de-adjust position could stop the adjustment function from working!**
- **After reaching the end stop position always then adjust by turning the reset shaft clockwise 90 degrees, thus activating the adjustment function.**

4. Leave the Torx 55 in position in the reset shaft.

5. Actuate the brakes 5 times by pressing and releasing the vehicles brake pedal through its full stroke. See Fig. 8. If no brake chamber is fitted then actuate the brake chamber lever manually with a suitable tool.
6. The Torx 55 must rotate clockwise only on each actuation, showing that the automatic adjustment function is working.
7. If the Torx 55 rotates back and forth or not at all, then the adjustment function is not working correctly.
8. To check further, manually adjust the reset shaft. Turn the Torx 55 clockwise by 360 degrees, and then anti-clockwise by 180 degrees. Thus ensuring the adjuster is not jammed at the full de-adjust position.
9. In doing so, observe the following. Note that once the excessive clearance is taken up by the adjuster the Torx 55 will naturally stop rotating. If in doubt, turn the Torx 55 anti-clockwise by 180 degrees and then press the brake pedal again to check.
10. If the Torx 55 still rotates back and forth during actuation then the adjustment function is defective and the calliper must be replaced.

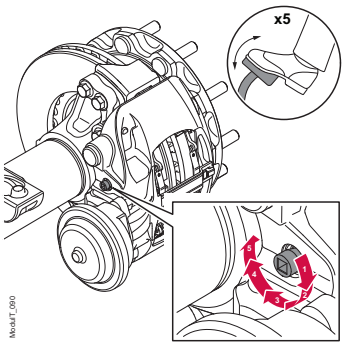

Fig. 8 · Brake actuation

See chapter "5.7 Replacement of Disc Brake".

3.4 Final Procedure

1 Use the Torx 55 socket to manually rotate the reset shaft clockwise until it stops, so that the brake pads lie on the brake disc.

2 Then turn the reset shaft 2 clicks anti-clockwise, see Fig. 9. That is the procedure for the basic setting after successful repair or brake pad change.

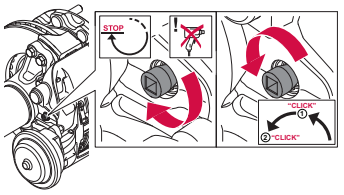

Fig. 9 · Basic setting

3 Fit the reset shaft protection plug on the brake calliper and verify that it is correctly aligned and fully in the correct sealing position. Failure to do so may compromise the service life of the brake! See Fig. 10.

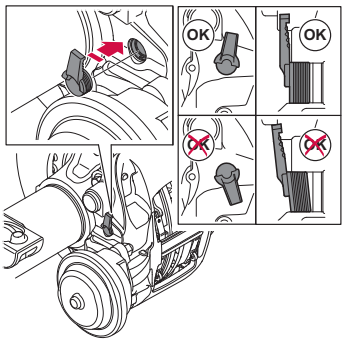

Fig. 10 · Attach the protection plug correctly

3.4.1 Mounting of the wheel

Danger!

Make sure that the brake hoses are in good condition, that they are laid/ducted and fastened correctly.

1. Check the free rolling resistance. The disc brake must not be obstructed in any way.
2. Mount the wheel, see Fig. 11.

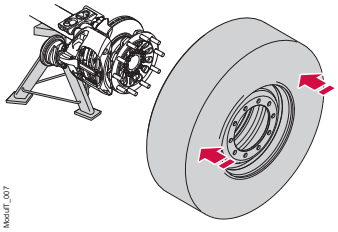

Fig. 11 · Mounting of the wheel

3.4.2 Lowering of the vehicle axle

Danger!

If the disc brake is equipped with a parking brake function, ensure that the brake system is pressurised, that the spring brake chamber is fully engaged and mechanically secured in the active position.See the vehicle manufacturer's instructions. See the vehicle manufacturer's instructions.

Careful!

Actuate the parking brake. Make sure that there is sufficient air in the system (min. 6 bar).

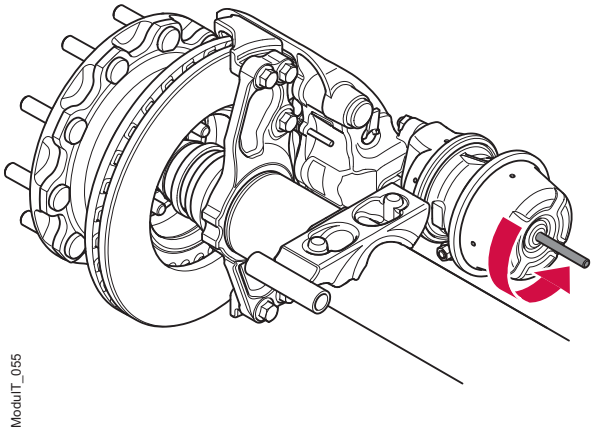

Fig. 12 · Mechanically secure in released position

1. Activate the parking brake if fitted with a spring brake chamber.
2. Lift the axles so that the stands can be removed.
3. Carefully lower the vehicle to the ground.
4. Remove the wheel blocks, see Fig. 13.

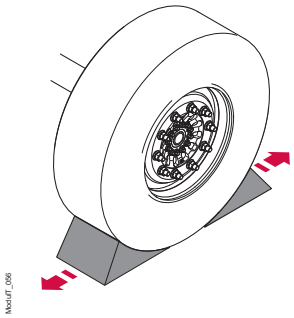

Fig. 13 · Removing the safeguards

4 Inspection Procedures

4.1 General Information

The objective of this chapter is to give guidance on how inspection of the brake components shall be conducted. Always start by consulting the Inspection interval table below in chapter 4.2.

The Inspection interval table displays how frequent the different brake components shall be inspected and on which pages the check instructions are found.

The majority of the inspections demand that the wheel is removed from the vehicle. Before removing the wheel read chapter "2. Safety Precautions" followed by "3. Initial and Final Procedures".

4.2 Inspection intervals

The check intervals specified in the table below are maximum intervals. Depending on the vehicle application, type of driving, adjustment to the vehicle manufacturer's service/inspection intervals etc, there may be a need for more frequent inspections.

Inspection intervals

1 = Functional test **2 = Adjustment** **3 = Visual inspection** *** = With wheels fitted** **** = With wheels removed**	**Before starting to use vehicle**	**Daily**	**After 3,000 to 5000 km**	**Every 3 month**	**Every 12 month**	**If parts are replaced in operating system**	**See Page**
Adjustment of Control System/Valves	1/2*	–	–	–	–	1/2*	⇒Chapter 2.3
Braking Force Distribution - Tractor/ Trailer	–	–	1/2*	–	–	1/2*	⇒Chapter 2.3.3
Safety Check	–	1*	–	–	–	–	⇒Chapter 4.3.1
Brake Pads	–	–	–	3**	–	–	⇒Chapter 4.3.3
Brake Disc	–	–	–	3**	–	–	⇒Chapter 4.3.5
Function Test	–	–	–	–	1**	–	⇒Chapter 3.3
Plugs and Protective Cups	–	–	–	–	1**	–	⇒Chapter 4.3.6
Thrust Plate Guide Pins	–	–	–	–	1**	–	⇒Chapter 4.3.7
Actuation Interface	–	–	–	–	1**	–	⇒Chapter 4.3.8
Slide Pin Bellows	–	–	–	–	1**	–	⇒Chapter 4.3.9
Adjustment Screw Bellows	–	–	–	–	1**	–	⇒Chapter 4.3.10
Slide Function	–	–	–	–	1**	–	⇒Chapter 4.3.11

4.3 Inspections

4.3.1 Daily Visual Inspection

Danger!

Contact the Service Workshop immediately if there is any sign of reduced performance or the brakes do not work properly.

1. Check that the brakes function properly before driving and that they work effectively and smoothly.
2. Check that the service and parking brake function is effective by trying to drive the vehicle with the service and parking brake applied.

4.3.2 Check overall condition

1. Make sure you have good lighting conditions.
2. Inspect visible parts of the brake and its components. Look for:
   - damage,
   - collection of debris,
   - corrosion
   - overheating signs,
   - cracks in brake discs,
   - unusual wear etc.

4.3.3 Check Brake Pad wear

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Note:

Step 1 in this procedure only indicate the pad wear of the outer pad! For a full examination do all steps.

1. Inspect the position of the Visual Wear Indicator (VWI), see Fig. 14. This check can be done with either the wheel fitted or removed. The VWI provides an indication of pad wear condition, but it does not provide an accurate measurement of pad wear on both pads. To obtain an accurate wear measurement of both pads, continue with the following instructions.
2. Remove the wheel according to ⇒Chapter 3.2.
3. Remove brake pads according to ⇒Chapter 5.2.2.
4. Look for unusual conditions like excessive corrosion and high heat cycles, i.e. delamination, discolouration, etc. If found, carry out the relevant measures, see chapter ⇒Chapter 8.2 for fault finding.

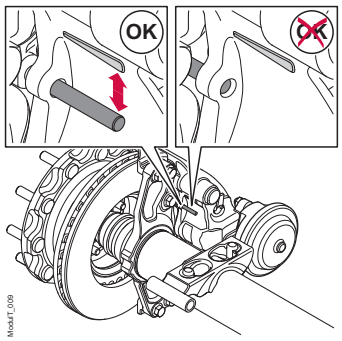

Fig. 14 · Inspection of the Visual Wear Indicator

5. On both brake pads measure the distance from back plate (A) to wear surface (B) of the brake pad in four places, see Fig. 15. Minimum permitted lining thickness (friction material) is 2 mm.
6. Check the condition of the back plate (A).
7. Replace brake pads if they are worn out or if they are expected to be so before the next inspection. For replacement follow the instructions in chapter ⇒Chapter 5.2.
8. If the inspection is completed satisfactorily, conclude by following chapters ⇒Chapter 5.2.3 and ⇒Chapter 5.2.4.

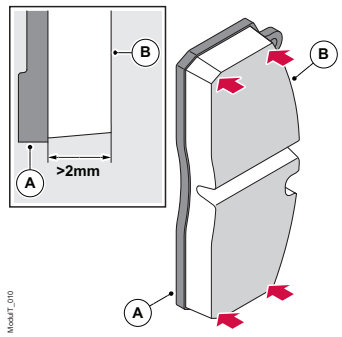

Fig. 15 · Measuring the pad wear condition

Note:

This brake disc inspection check procedure is only a general guide. Refer to the vehicle manufacturers documentation for specific brake disc information and instruction.

4.3.4 General Brake Pad clearance check

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Note:

- Checking the clearance is only required for an approximation of the clearance between the brake disc and the brake pads.
- The check can be carried out with or without the brake chamber fitted.

Note:

- This check is best performed after the wheel is removed and before the brake is de-adjusted. For this situation the steps 2 and 3 below can be skipped.

1. Read and follow chapters ⇒Chapter 3.2 and paragraph 5 ⇒Chapter 5.2.2 Remove Brake Pads, prior to checking the pad clearance.
2. Adjust the reset shaft by inserting and manually turning the Torx 55 socket clockwise until it comes to a stop and any excessive clearance is removed. Then de-adjust the reset shaft by turning it anti-clockwise by 2 clicks.
3. Activate the brake until the Torx 55 male no longer rotates because any excessive clearance has been removed by the adjustment function.
4. Insert two feeler gauges in between the calliper and the outer brake pad to measure the clearance. Position the feeler gauges in the upper and lower part of the brake pad back plate so an average clearance is measured, see Fig. 16.
5. The normal running clearance is between 0.7 mm and 1.1mm. If the measurement is outside of the normal running condition then refer to chapter ⇒Chapter 8.2 for further investigations.
6. Once the inspection is completed satisfactorily, conclude by reading paragraph 5 from chapter ⇒Chapter 5.2.3 “Install Brake Pads” and the entire chapter ⇒Chapter 5.2.4 "Final Procedure”.

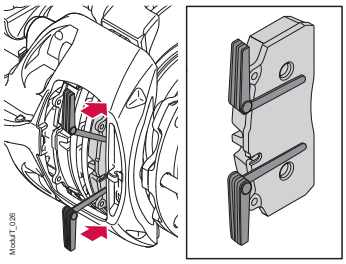

Fig. 16 · Correct location of the feeler gauges

4.3.5 Check Brake Disc

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

1. Look for wear, damages and cracks, see Fig. 17. Also refer to the axle/vehicle manufacturer instructions. Cracks that enter the cooling ducts via the outer radius are not permitted!

Acceptable crack length	Unacceptable crack length
<75% of brake disc width	>75% of brake disc width

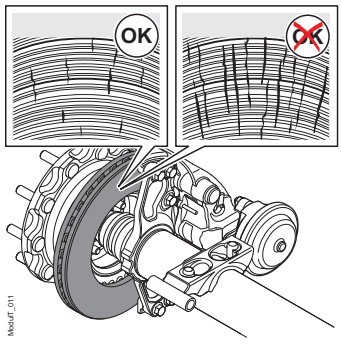

Fig. 17 · Inspection of the Brake Disc

2. Measure the thickness of the brake disc using a slide calliper. If the brake disc has a wear ridge, the measurement can be performed using two spacers (B) (e.g. 5 mm thick flat washers), see Fig. 18. Reduce the measured dimension by the total thickness of the two spacers (B).

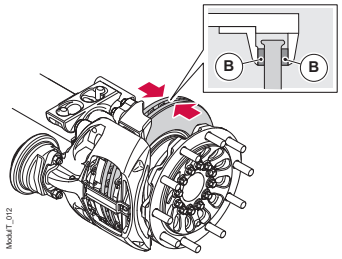

Fig. 18 · Measuring the brake disc thickness

Minimum thickness of the brake disc is 37 mm.

The brake disc must be replaced if the wear limits have been exceeded.

Note:

This brake disc inspection check procedure is only a general guide. Refer to the vehicle manufacturers documentation for specific brake disc information and instruction.

4.3.6 Check Plugs and Protective Cups

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Careful!

- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**
- **Failure to follow the instructions below could compromise safety and/or reduce the life of the Disc Brake and its components.**

1. Read and follow chapter ⇒Chapter 3.2 "Initial Procedure" prior to inspecting the protective plugs and cups.
2. Remove dirt from surfaces if necessary.
3. Check for signs of excessive heat exposure, discolouration, debris etc.
4. The following plugs and protective cups shall be in place and intact:
   - The reset shaft protection plug identified as (A) and calliper seal (B), see Fig. 19,
   - Protection plug (B) is never removed.

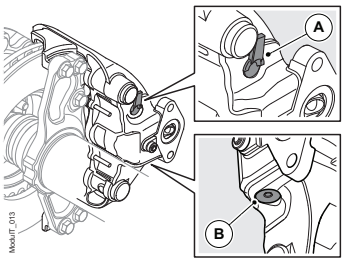

Fig. 19 · Two protection plugs

5. The three protective cups; two for slide pin protection (C) and one for the mechanism (D), see Fig. 20.
6. Once the inspection is completed satisfactorily, conclude by reading and following chapter ⇒Chapter 3.4 "Final Procedure".

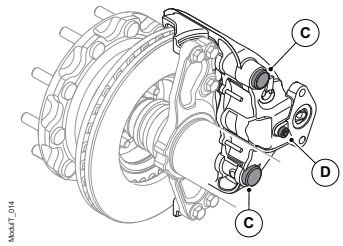

Fig. 20 · Three protective cups

Careful!

Never remove the protection plug (B) or the protective cup (D) see Fig. 20 and Fig. 19. If the protection plug (B) is removed it will void warranty and will compromise the life of the disc brake!

4.3.7 Check Thrust Plate Guide Pins

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Careful!

Use a vacuum cleaner to clean surfaces. Do not use compressed air

1. Read and follow chapter ⇒Chapter 3.2 "Initial Procedure" prior to inspecting the thrust plate guide pins.
2. Remove dirt from surfaces as necessary.
3. Check that the two thrust plate guide pins (E) are in their correct position, see Fig. 21
4. Check that the thrust plate with guide pins are free to move without obstruction.
5. Once the inspection is completed satisfactorily, conclude by reading and following chapter ⇒Chapter 3.4 "Final Procedure".

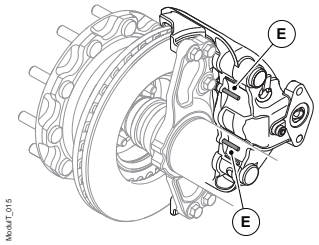

Fig. 21 · The two thrust plate guide pins

4.3.8 Check Actuation Interface

Danger!

- **Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!**
- **Pressure from lines and components shall be released before opening them!**

Careful!

- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**
- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**

This inspection procedure covers both types of brake chamber; normal (service) and spring brake (parking) chambers.

1. Read and follow ⇒Chapter 3.2 "Initial Procedure" prior to inspecting the actuation interface.
2. Thoroughly clean around the mating surfaces of the brake chamber (A) and calliper (B) to ensure that dirt does not get into the mechanism area when removing the brake chamber. See Fig. 22.
3. Release the parking brake, see ⇒Chapter 3.2.1.

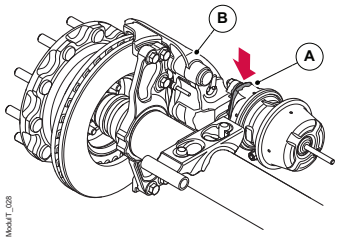

Fig. 22 · Mating surfaces of the brake chamber and calliper

4. If applicable ensure that the spring brake chamber Fig. 23, (F) is fully disengaged and mechanically secured in the released position.
5. Ensure that the brake chamber is depressurised.
6. Remove the two nuts (E) holding the brake chamber. Remove the brake chamber (A/F) from the calliper (B), see Fig. 23.

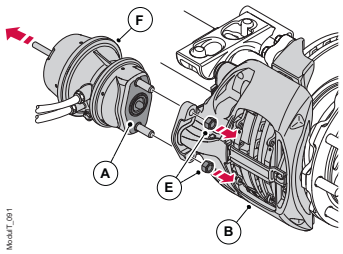

Fig. 23 · Remove Brake Chamber components

7. With the brake chamber removed and secured, the brake chamber actuation rod should protrude approx. 15 mm in its rest position, see Fig. 24.
8. Activate the service brake, the brake chamber actuation rod should protrude approx. 65 mm.
9. Also check that the actuation rod extends perpendicular to the external seal flange.

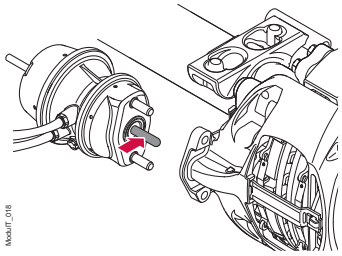

Fig. 24 · Piston rod

10. Check through the aperture in the brake chamber attachment flange for moisture/corrosion, see Fig. 25. It's important to look inside the aperture and not just on the surface. If corrosion is seen then further inspection is necessary. If concluded that water has ingressed causing internal corrosion/damages to the mechanism then replace the calliper complete to avoid operating problems. If action is required see "Replacement of Calliper".

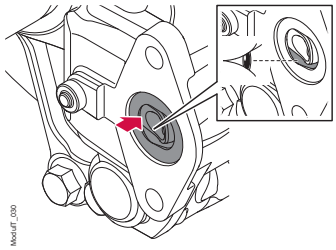

Fig. 25 · Brake chamber

11. On the brake chamber, there must be an internal bellows (A) on the push rod, see Fig. 26.
12. Check that the bellows are complete and not damaged by looking around and down the push rod shaft. Also look for signs of water or corrosion which may be a sign that the bellows are damaged.
13. Check that the external seal flange (B) is correctly seated in place, intact and undamaged.
14. Once the inspection is completed satisfactorily, conclude by reading and following chapters ⇒Chapter 5.3.3 and ⇒Chapter 5.3.4.

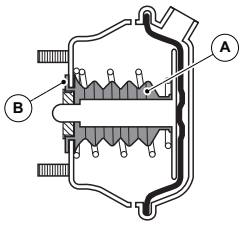

Fig. 26 · Internal view of a brake chamber

4.3.9 Check Slide Pin Bellows

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Careful!

- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**
- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**

1. Read and follow ⇒Chapter 3.2 "Initial Procedure" prior to inspecting the slide pin bellows.
2. Inspect the Leading slide pin bellows (A) and the Trailing slide pin bellows (B), see Fig. 27. Look all around the bellows for damage signs than could have been caused by debris, stones or overheating.
3. If the bellows are damaged then they must be replaced. For instructions on how to replace the bellows read and follow chapter ⇒Chapter 4.3.11.
4. Once the inspection is completed satisfactorily, conclude by reading and following chapters ⇒Chapter 5.3.3 and ⇒Chapter 5.3.4.

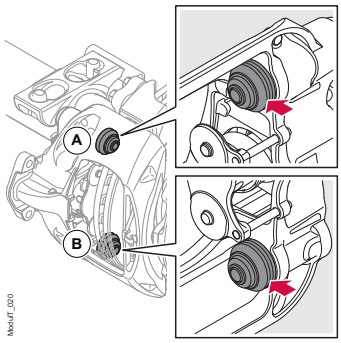

Fig. 27 · Inspecting the slide pin bellows

4.3.10 Check Adjustment Screw Bellows

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Careful!

- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**
- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**
- **Never use an impact wrench or suchlike to turn the reset shaft. This may damage the disc brakes mechanism! Torque is 20 Nm max.**

Note:

Do not over adjust/extend the thrust plate whilst carrying out the inspection. Over adjustment/ extension will cause the thrust plate to disengage from the adjustment screw and if done unintentionally may cause damage to the thrust plate bellows! Min. distance between the calliper and thrust plate is 60 mm.

1. Read and follow ⇒Chapter 3.2 "Initial Procedure" and ⇒Chapter 5.2.2 "Remove Brake Pads" prior to inspecting the adjustment screw bellows.
2. Use the Torx 55 socket to manually turn the reset shaft clockwise to adjust the brake so that the thrust plate (A) is extended and the bellows can be viewed. Stop when the distance between the inner pad face of the thrust plate and outer pad face on the calliper is 60 mm, see Fig. 28.

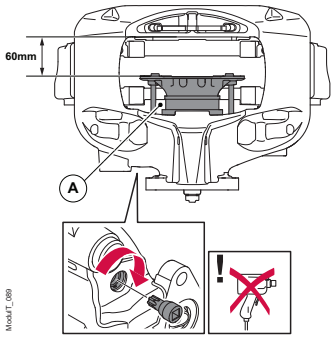

Fig. 28 · Max. extension to check the thrust plate bellows

3. Inspect the adjustment screw bellows, see Fig. 29. Look all around the bellows for damage signs than could have been caused by debris, stones or overheating.
4. If the bellows are damaged then they must be replaced. For instructions on how to replace the bellows read and follow chapter ⇒Chapter 5.4 "Replacement of Adjustment Screw Bellows".
5. If OK then manually de-adjust the thrust plate by turning the Torx 55 reset shaft anti-clockwise, until the position required to refit the brake pads.
6. Once the inspection is completed satisfactorily, conclude by reading and following chapters ⇒Chapter 5.3.3 and ⇒Chapter 5.3.4.

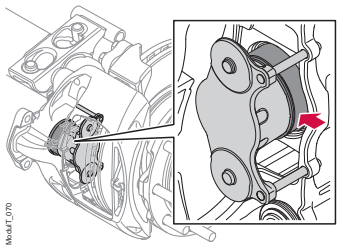

Fig. 29 · Inspecting the Adjustment Screw Bellows

4.3.11 Check Slide Function

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

Careful!

- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**
- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**

1. Read and follow ⇒Chapter 3.2 "Initial Procedure" and ⇒Chapter 5.2.2 "Remove Brake Pads" prior to inspecting the slide function.
2. Once the brake pads are removed, move the calliper by hand back and forth to check its movement, see Fig. 30. The calliper
3. If the movement is felt to be obstructed in some way then it is necessary to determine the root cause, see chapter⇒Chapter 8.2 Fault Finding for assistance in this.
4. If the root cause investigation concludes that the slide function needs replacing then follow chapter ⇒Chapter 5.5 "Replacement of Slide Function Assembly".
5. Once the inspection is completed satisfactorily, conclude by reading and following chapters ⇒Chapter 5.3.3 and ⇒Chapter 5.3.4.

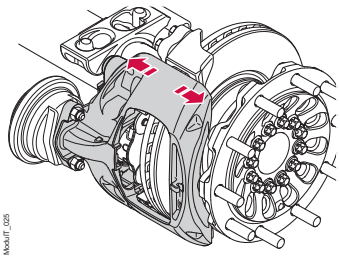

Fig. 30 · Free movement of the calliper, it must be free to slide on the leading and trailing slide pins.

Note:

Obstruction of the slide function can cause operational problems like hot brakes and uneven brake pad wear.

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5 Replacement Procedures

5.1 General Information

The objective of this chapter is to give instruction and guidance on how the disc brake and/or its components shall be replaced. All the replacement procedures in this chapter require that the wheel is taken off to enable the replacement work to be carried out.

5.2 Replacement of Brake Pads

5.2.1 Initial Procedure

Read and follow chapter ⇒Chapter 3.2 "Initial Procedure" prior to removing the brake pads.

5.2.2 Remove Brake Pads

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

- Sudden release of tensioned springs can cause injury!
- Do not actuate the brake when changing the brake pads!
- Also, ensure the air brake system is pressurised during the replacement procedure, min. 6 bar! If the pressure drops below 6 bar the park brake will be actuated.

Careful!

- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**
- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**

1. If necessary remove dirt, dust and other possible obstruction.

Careful!

- **Use SAF-HOLLAND tools only, where this is specified.**
- **Never use an impact wrench or suchlike to turn the reset shaft. This will damage internal parts of the mechanism! Torque is 20 Nm max.**

Note:

The thrust plate must be fully retracted to be able to fit new pads.

2. Remove the reset shaft protection plug. See Fig. 31.
3. Use the Torx 55 socket to manually turn the reset shaft anti-clockwise to de-adjust the brake so that the thrust plate fully retracts to its inner position. A clicking sound shall be heard and felt when retracting. The stop at fully retracted inner thrust plate position must be distinct but do not exceed 20 Nm in torque or leave it tightened in this position. In the de-adjust position, the adjustment function is overridden.

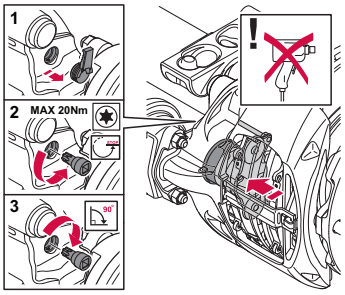

Fig. 31 · De-adjust the thrust plate via the reset shaft

Careful!

Always ensure the pad retainer spring bracket is fully held down whilst levering out the pad retainer.

4. Remove the pad retainer by first pushing and holding down the spring bracket (A), see Fig. 32. Whilst the spring bracket (A) is held down, slide out and remove the pad retainer (B). A tool can be used to help slide out the pad retainer if unable to do so by hand. Continue to remove the two pad springs (C).

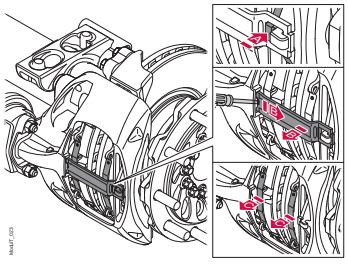

Fig. 32 · Remove Brake Pad components

Careful!

Always remove the outer brake pad first! You cannot directly pull out the inner brake pad with the outer still in place as the inner brake pad is located to the thrust plate on two points.

5. Remove the brake pads. Always remove the outer brake pad (A) first, followed by the inner brake pad (B). See Fig. 33. This is because the inner brake pad back plate locates on two holes which mate to the thrust plate, therefore you cannot directly pull out the inner brake pad with the outer brake pad still being in place. Once the outer brake pad is removed the calliper can be slid across to allow for the inner brake pad to be removed.
6. Remove the pad retainer spring bracket (C).

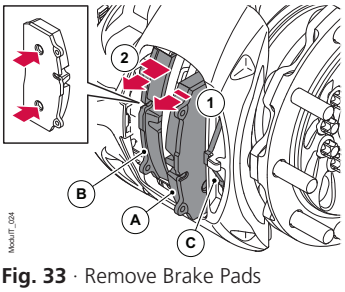

Fig. 33 · Remove Brake Pads

5.2.3 Install Brake Pads

1. Make sure that the brake is fully de-adjusted before fitting new brake pads.
2. Check that the contact surfaces on the carrier, calliper and thrust plate are free from dirt and corrosion. Clean the thrust plate as required.

Careful!

- **The inner brake pad must always be installed first!**
- **Ensure that the friction material faces the brake disc!**

3. First install the inner brake pad (B) in the carrier, note that the inner brake pad locates onto the thrust plate on two points, see Fig. 34. Then fit the outer brake pad (A).
4. Check that the contact surfaces on the pad retainer spring bracket are free from dirt and corrosion. Clean the pad retainer as required.
5. Install a new spring bracket (C) into the calliper and ensure it is seated in position correctly.

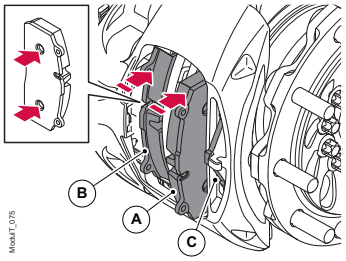

Fig. 34 · Install Brake Pads

Danger!

Upon assembly, ensure the pad retainer spring bracket is in its correct locking position.

6. Fit the new pad springs (A) and the pad retainer (B). The pad retainer is fitted by first locating the pad retainer in the housing end in the calliper aperture, then compressing the pad springs and locating the pad retainer slot over the calliper latch, finally slide the pad retainer under the calliper latch until the spring bracket pops into its locking position, see Fig. 35. If necessary, use a tool to help push the pad retainer into position.

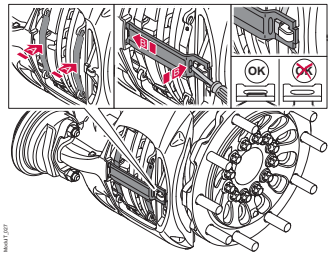

Fig. 35 · Install Brake Pads

5.2.4 Final Procedure

To conclude this procedure read and follow chapters:

1. Function Test "⇒Chapter 3.3", to ensure that the disc brake is working correctly.
2. Final Procedure "⇒Chapter 3.4"

5.3 Replacement of Brake Chamber

5.3.1 Initial Procedure

Read and follow chapter ⇒Chapter 3.2 "Initial Procedure" prior to removing the spring brake chamber.

5.3.2 Remove Brake Chamber

Danger!

Wear respiratory protection in order to avoid inhaling particles which can be hazardous to your health! Brake pad wear produces dust which can cause lung damage!

- If the disc brake is equipped with a parking brake function, ensure that the brake system is depressurised, that the spring brake chamber is fully disengaged and mechanically secured in the released position. See the vehicle manufacturer's instructions.
- Pressure from lines and components shall be released before opening them!

Careful!

- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**

Careful!

- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**

1. Thoroughly clean around the mating surfaces of the brake chamber (A) and calliper (B) to ensure that dirt does not get into the mechanism area when removing the brake chamber. See Fig. 36.

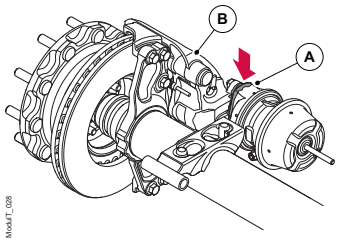

Fig. 36 · Mating surfaces of the brake chamber and calliper

2. If applicable ensure that the spring brake chamber (F) is fully disengaged and mechanically secured in the released position. See Fig. 37.
3. Ensure that the brake chamber (A) is depressurised.
4. Mark and remove the hose connections of the service brake (C) and if applicable the parking brake (D).
5. Remove the two nuts (E) holding the brake chamber. Remove the brake chamber (A) from the calliper (B).
6. Once the brake chamber is removed it is good practice and highly recommended to read and follow chapter ⇒Chapter 4.3.8 "Check Actuation Interface".

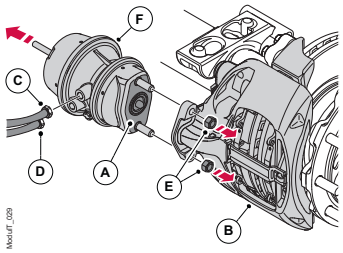

Fig. 37 · Remove Brake Chamber components

5.3.3 Install Brake Chamber

1. Check that the brake chamber being installed is the correct one for the application and vehicle. If a spring brake chamber is being installed, ensure that the parking brake spring is caged in accordance with the manufacturer's instructions.
2. Once the brake chamber is removed it is good practice and highly recommended to read and follow chapter ⇒Chapter 4.3.8 "Check Actuation Interface".

Careful!

It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.

3. Check that the surface of the calliper that mates with the brake chamber is free from dirt, moisture and corrosion. See Fig. 38. Ensure the brake chamber seal is in the correct position and not damaged.
4. Put a knob of general purpose grease in the ball cup of the brake chamber lever. Do not overfill the cup or let grease fall inside the brake.

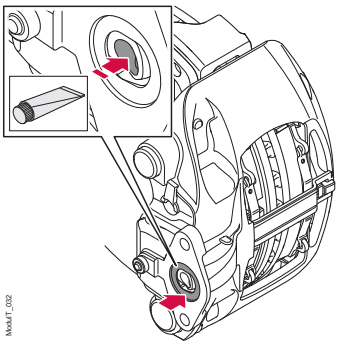

Fig. 38 · Pre-brake chamber mounting activity

5. Fit the new brake chamber (A) to the calliper (B) with nuts (E), see Fig. 39. Screw the nuts home first before torque tightening to ensure the brake chamber sits parallel. Brake chamber fixation nut tightening torque is 180 ± 20 Nm.

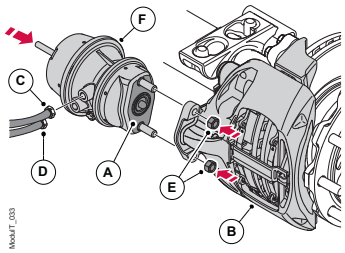

Fig. 39 · Install Brake Chamber components

Careful!

Do not mix up the hoses!

6. Fit the brake chamber hose connection of the service brake (C) and if applicable the parking brake (D). If fitting both hoses, ensure connections (C) and (D) are the correct way around. See Fig. 39.
7. Remove the ventilation drain plug that faces downwards from the brake chamber housing, see Fig. 40. Also from the spring brake chamber if applicable.

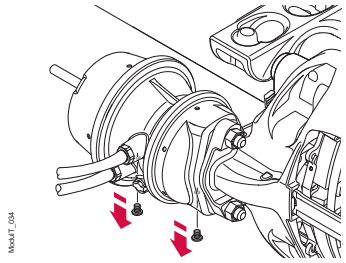

Fig. 40 · Remove the ventilation drain plug

Careful!

Apply air to the parking brake. Make sure that there is sufficient air in the system (min. 6 bar).

8. If applicable, release the parking brake and disengage the spring brake chamber's caging mechanism so that the spring is released. Min. 6 bar in compressed air system.
9. With the service brake engaged and, where applicable, with the parking brake released, check the brake chambers, hoses and connections for leaks or damage.

5.3.4 Final Procedure

To conclude this procedure read and follow chapters:

1. Function Test "⇒Chapter 3.3", to ensure that the disc brake is working correctly.
2. Final Procedure "⇒Chapter 3.4"

5.4 Replacement of Adjustment Screw Bellows

5.4.1 Initial Procedure

Read and follow the chapters below prior to removing the adjustment screw bellows.

1. Initial Procedure, ⇒Chapter 3.2.
2. Remove the brake pads, ⇒Chapter 5.2.2.
3. Remove the brake chamber, ⇒Chapter 5.3.2.
4. Remove the disc brake, ⇒Chapter 5.7.2.

5.4.2 Remove Adjustment Screw Bellows

1. Fasten the disc brake securely in a vice with soft jaws, see Fig. 41 for clamping arrangement. Ensure that the jaws of the vice do not damage the disc brake.

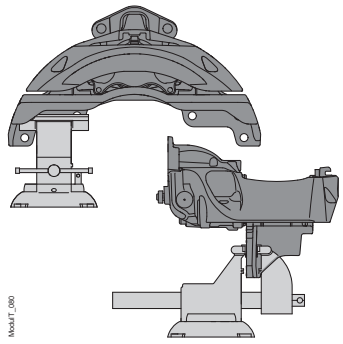

Fig. 41 · Clamping arrangement for replacing adjustment screw bellows

2. Using the Torx 55 socket, manually turn the reset shaft clockwise to extract the thrust plate (A). Continue extracting until the thrust plate unscrews fully and becomes detached from the adjustment screw, see Fig. 42. The point at which the thrust plate becomes detached is when the gap between the thrust plate inner pad face and the calliper outer pad face becomes smaller than 52 mm. Be careful when removing the thrust plate not to damage its internal threads or the external threads on the adjustment screw.
3. Once the thrust plate becomes detached from the adjustment screw, by hand pull off the adjustment screw bellows from the thrust plate and calliper. Do not use any tools for this removal because damaging the sealing surfaces could cause water penetration leakage or seal corrosion upon re-assembly!

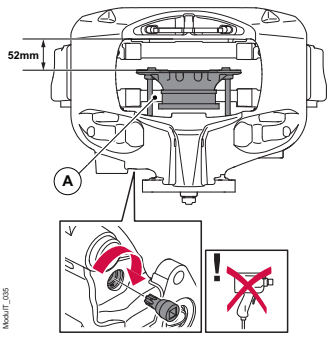

Fig. 42 · Extract the thrust plate

5.4.3 Cleaning

Careful!

- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**
- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**
- **Make sure that dirt and impurities do not enter the opening for the adjustment screw!**

Clean the thrust plate, the adjustment screw and the adjustment screw bellows sealing surfaces in the calliper. Ensure the parts are free from dirt, dust, debris, moisture and corrosion.

1. Fasten the thrust plate securely in a vice with soft jaws, see Fig. 43 "Clamping Arrangement". Do not over tighten or damage the thrust plate whilst clamping!
2. Clean the internal threaded surface of the thrust plate.
3. Ensure that the contact surfaces between the thrust plate and the bellows are clean and free from dirt, moisture and corrosion.

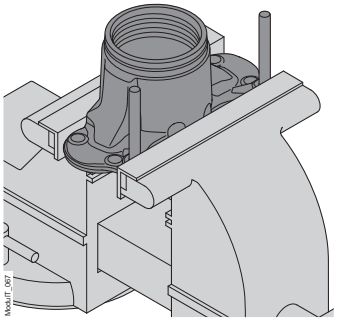
Fig. 43 · Clamping arrangement for thrust plate

Careful!

Only use SAF special tools where specified!

4. Using SAF special tool P/N 4 434 3886 00 (C) press the adjustment screw bellows (A) into position on the thrust plate (B), see Fig. 44. Check that the bellows is correctly seated in position on the thrust plate.
5. Clean the external threaded surface of the adjustment screw. Ensure the parts are free from dirt, dust, debris, moisture and corrosion.
6. Apply the grease supplied with the spare parts kit, to the internal thread off the thrust plate and the external thread of the adjustment screw.
7. Remove the thrust plate from the vice.

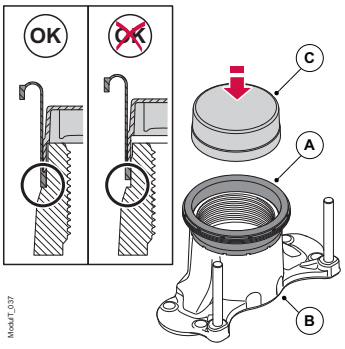

Fig. 44 · Attach the Adjustment Screw Bellows

Careful!

Do not cross thread the thrust plate and the adjustment screw!

8. By hand, hold the thrust plate in position against the adjustment screw. Insert the Torx 55 socket into the reset shaft and turn carefully anti-clockwise, as the adjustment screw turns, carefully engage the thrust plate threads onto the adjustment screw. Be careful not to cross thread the parts, if the thread becomes tight or locks, turn the reset shaft clockwise to release the thrust plate, then try again. A clicking sound will be heard and felt when turning the reset shaft anti-clockwise, see Fig. 45.
9. Shortly after the threads are engaged ensure that the two thrust plate guide pins correctly locate in their calliper holes.
10. Continue to retract the thrust plate until the dimension between the thrust plate inner pad face and the calliper outer pad face is less than 70 mm, see Fig. 45.
11. Assemble SAF special tools P/N 4 434 3887 00 and P/N 4 434 3888 00 and insert them into the calliper end of the adjustment screw bellows. See Fig. 46.
12. By hand, firmly press on the special tool with equal and parallel force so that the adjustment screw bellows is pressed into position within the calliper.
13. The special tool can be removed, rotated, and then reapplied to aid the equal and parallel bellows seating.

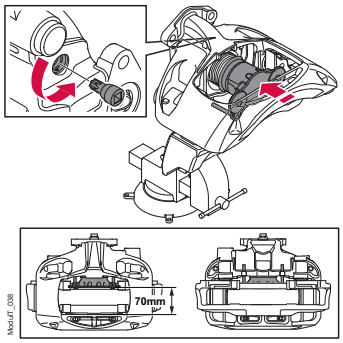

Fig. 45 · Loading the thrust plate

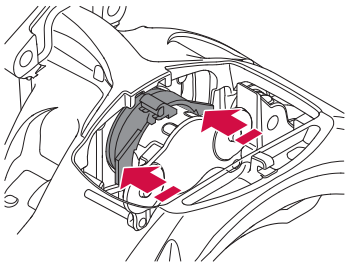

Fig. 46 · Pressing in the Adjustment Screw Bellows

14. Remove the special tool. Check that the bellows is correctly seated all around within the calliper, see Fig. 47. Also, re-check the bellows is seated correctly on the thrust plate, see Fig. 44. Failure to seat the bellows correctly will compromise the life of the brake!
15. Retract the thrust plate fully to its inner position by manually turning the reset shaft anti-clockwise. A clicking sound shall be heard and felt when retracting. The stop at fully retracted inner thrust plate position must be distinct but do not exceed 20 Nm in torque or leave it tightened in this position. In the de-adjust position, the adjustment function is overridden.

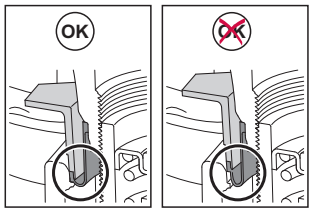

Fig. 47 · Adjustment screw bellows seated correctly/incorrectly

5.4.4 Final Procedure

To conclude this procedure read and follow chapters:

1. Install the disc brake, ⇒Chapter 5.7.3.
2. Install the brake pads, ⇒Chapter 5.2.3.
3. Install the brake chamber, ⇒Chapter 5.3.3.
4. Function Test "⇒Chapter 3.3", to ensure that the disc brake is working correctly.
5. Final Procedure, ⇒Chapter 3.4.

5.5 Replacement of Slide Function Assembly

5.5.1 Initial Procedure

Read and follow the chapters below prior to removing the slide function assembly.

1. Initial Procedure, ⇒Chapter 3.2.
2. Remove the brake pads, ⇒Chapter 5.2.2.
3. Remove the brake chamber, ⇒Chapter 5.3.2.
4. Remove the disc brake, ⇒Chapter 5.7.2.

5.5.2 Remove Slide Function Assembly

Careful!

Only use SAF special tools where specified!

1. Fasten the disc brake securely in a vice with soft jaws, see Fig. 48 "Clamping Arrangement". Ensure that the jaws of the vice do not damage the calliper.

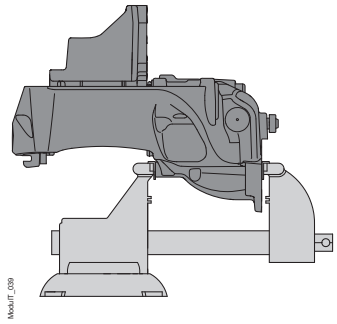

Fig. 48 · Clamping arrangement for inserting the slide function assembly

2. Use a small hammer and chisel to remove the leading and trailing protective cups (A), see Fig. 49. The protective cups are not to be re-used.

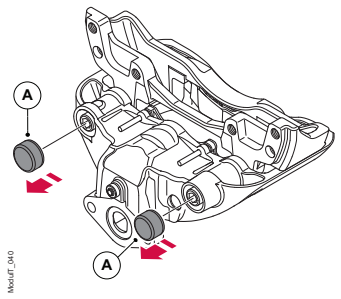

Fig. 49 · Remove the protective cups

3. Using a long drive 14 mm Insex, remove both screws (B), see Fig. 50. The screws are not to be re-used.

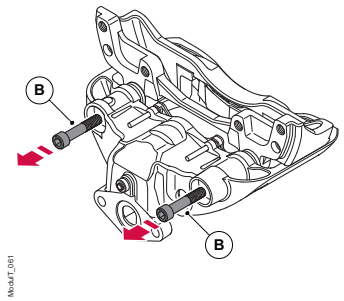

Fig. 50 · Remove the slide pin bolts

4. Remove the carrier from the calliper by gently rocking the carrier to release it from the slide pins and bellows. Once released press slide pins back enough to be able to lift out the carrier, see Fig. 51.

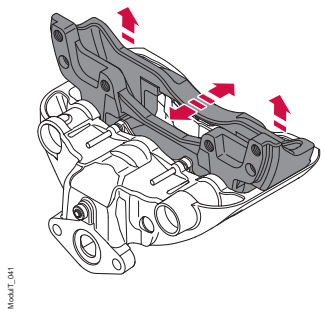

Fig. 51 · Remove the carrier

Careful!

Be careful not to damage the slide pin bellows sealing surfaces in the calliper!

5. By hand push out and remove the leading slide pin (C) and the trailing slide pin (D), see Fig. 52.

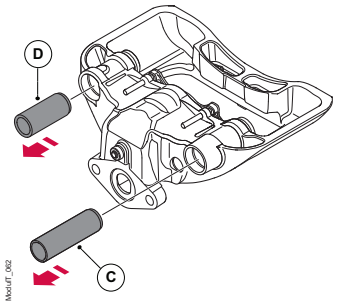

Fig. 52 · Remove the guide pin

6. Remove both guide pin bellows (E), see Fig. 53. If necessary, use a small screwdriver in order to lever them out. Be careful not to damage the guide pin bellows sealing surfaces if using a tool to levering out the bellows!

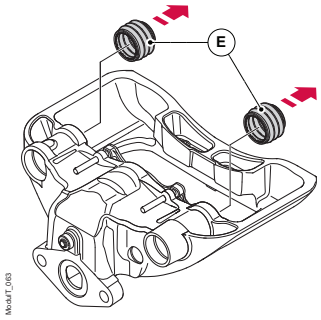

Fig. 53 · Remove bellows and slide pins

7. Carefully follow the steps below ⇒Step 8 and ⇒Step 9, to remove the two leading bearings (F) and the spacer (G) and trailing composite bushing (H), see Fig. 54.

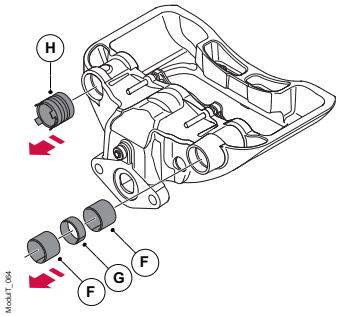

Fig. 54 · Remove the slide bearings and composite side bushing

8. To remove both bearings (F) and the spacer (G) on the leading side, assemble in sequence SAF special tools P/N 4 434 3884 00, P/N 4 434 3837, P/N 4 434 3848 00, P/N 4 434 3841 00; P/N 4 434 3890 00 and P/N 4 434 3889, as shown in Fig. 55.
9. Once fitted correctly, turn the threaded tool clockwise which will pull out the two bearings (F) and the spacer (G). If necessary, rotate the mandrel P/N 4 434 3889 00 half way through the extraction process so the nut P/N 4 434 3841 00 can be held.
10. The composite bushing (H) on the trailing side should be removable by hand.

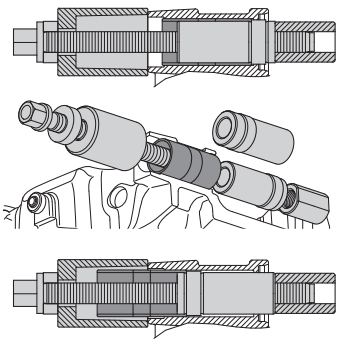

Fig. 55 · Remove the trailing slide bearing

11. If this is not possible, assemble in sequence SAF special tools P/N 4 434 3884 00, P/N 4 434 3837, P/N 4 434 3848 00, P/N 4 434 3841 00; P/N 4 434 3890 00 and P/N 4 434 3889, as shown in Fig. 56.
12. Once fitted correctly, turn the threaded tool clockwise which will pull out the composite bushing.

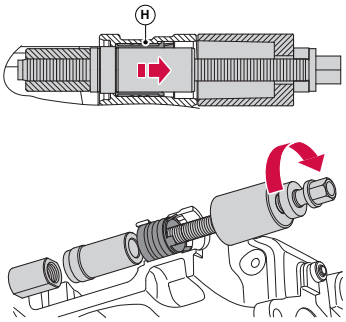

Fig. 56 · Remove the composite side bushing

5.5.3 Cleaning

Careful!

- **Use a vacuum cleaner to clean surfaces. Do not use compressed air**
- **It is important to take care when using chemicals and/or cleaning tools (e.g. knife, brush, etc). This to avoid damage or displacement of hoses, seals and other components.**

1. Clean the bearing/bush/bellows sealing surfaces of the calliper to ensure they are free from dirt, moisture, corrosion and damage, see Fig. 57.
2. If the sealing surfaces have lost their protective surface coating, apply/smear a small amount of general purpose grease over the whole area so when parts are refitted the grease will provide corrosion protection.

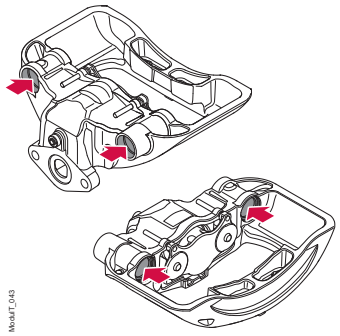

Fig. 57 · Clean the calliper bearing/ bushing mating surfaces

5.5.4 Install Slide Function Assembly

Careful!

Only use SAF special tools where specified!

1. Carefully follow the steps below ⇒Step 8 and ⇒Step 9, to remove the two leading bearings (F) and the spacer (G) and trailing composite bushing (H), see Fig. 58.

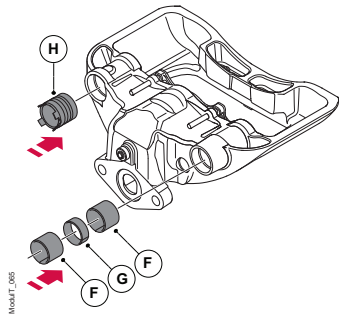

Fig. 58 · Install the leading slide bearings and trailing side bushing

2. To install the two new bearings (F) and the new spacer (G) on the leading side, assemble in sequence SAF special tools P/N 4 434 3837 00, P/N 4 434 3848 00, P/N 4 434 3841 00, P/N 4 434 3889 00 and P/N 4 434 3890 00, preloaded with the new parts, as shown in Fig. 59.
3. Once fitted correctly, turn the threaded tool clockwise which will pull into position the two bearings (F) and spacer (G) complete.

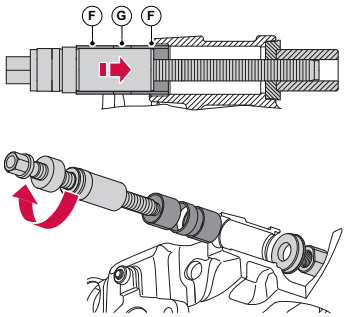

Fig. 59 · Tool assembly for leading slide bearings

4. Stop once the bearings are seated in there correct position up to the inside lip of the bearing location surface, see Fig. 60. It is important the bearings are seated correctly but not over tightened as this may cause damage.

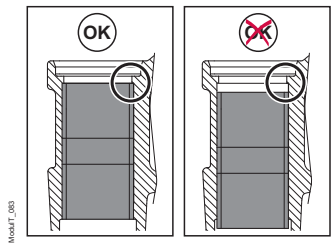

Fig. 60 · Leading side bearings installed correctly/incorrectly

Careful!

The trailing side composite bushing must be indexed correctly when being installed into position by hand. If not correctly indexed the slide function of the brake will not be correct.

5. To install the new composite bushing (H) on the trailing side, by hand, push the composite bushing into place, until it bottoms out. Ensure the index lug locates correctly in the calliper slot, see Fig. 61. No tools or high forces are required for this fitting process, nor should they be used! If used they may cause damage! If the bushing is not indexed correctly the slide pin and protective cup may not fit!

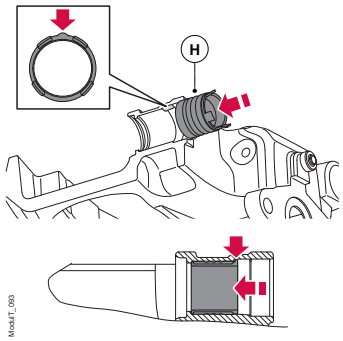

Fig. 61 · Inserting the trailing side composite bushing

Careful!

When inserted the slide pin bellows must seat correctly, bottoming out against the calliper location shoulder.

6. By hand, firmly push the two new slide pin bellows into their calliper locations ensuring that the bellows are seated correctly in position, see Fig. 62. It is important to check that the bellows is correctly seated within the calliper, do so by looking inside the bellows to see their seating. Failure to do so may compromise the sliding function of the brake.

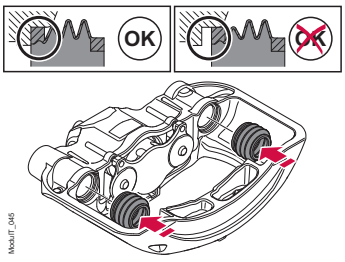

Fig. 62 · Install Slide Pin Bellows

7. By hand, insert the leading slide pin (C) into the bearings and the trailing slide pin (D) into the composite bushing, see Fig. 63. The longer slide pin (C) is fitted into the leading side. Note that one end of the slide pins has a machined groove, this side is inserted first. No grease is required.
8. Check that the bellows location ring is fitted correctly and in one piece. By hand, locate the bellows onto the end of the slide pins. Ensure the bellows and the bellows location ring seat correctly on the slide pins. Failure to do so may compromise the sliding function of the brake.
9. Clean the brake pad contact surfaces on the carrier, the calliper and the thrust plate. A wire brush can be used but be careful not to damage any of the bellows. Do not grind!

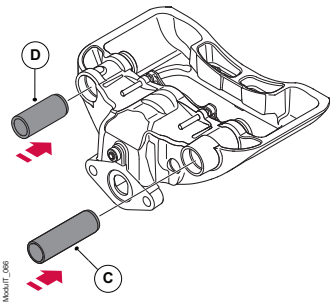

Fig. 63 · Insert the slide pins

Careful!

Never re-fit used bolts!

10. Lift the carrier into position in the calliper ensuring that the slide pins fitted with bellows do not interfere or obstruct. If necessary push out the slide pins slightly by hand whilst lowering in the carrier. Hold the carrier in position whilst the two bolts are inserted and screwed home. See Fig. 64.
11. Use a 3/4 long drive 14mm Insex to screw in and tighten the screws (B). The tightening torque is defined in chapter ⇒Chapter 6.2.2.

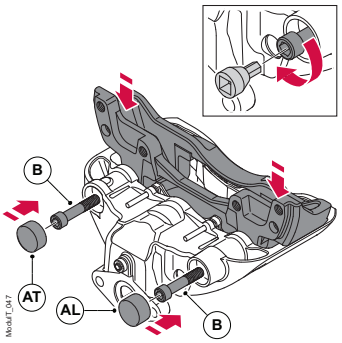

Fig. 64 · Refit the carrier and its fixing bolts

Careful!

The protective cups are different sizes and when fitted must be seated correctly. The leading cup is smaller than the trailing cup. The leading cup must bottom out against the bearing and the trailing cup must bottom out against the calliper shoulder

12. Carefully and squarely tap the protective cups (AT) and (AL) in place into the calliper using a soft headed mallet. Note that the cups are different sizes, the larger cup is fitted to the trailing side (AT) and the smaller to the leading side (AL). The leading protective cup (AL) seats raised from the casting surface whilst the trailing protective cup (AT) sits nearly flush. See Fig. 65.
13. Do not strike the cups hard or at an angle as this may damage them and therefore compromise the sliding function of the brake.
14. Ensure the protective cups are correctly seated and bottomed out, see Fig. 65.

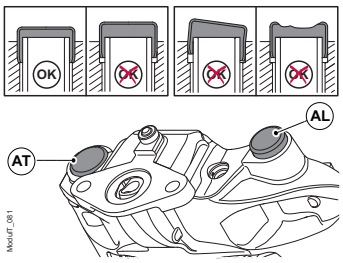

Fig. 65 · Correctly seating the protection cups

5.5.5 Final Procedure

To conclude this procedure read and follow chapters:

1. Install the disc brake, ⇒Chapter 5.7.3.
2. Install the brake pads, ⇒Chapter 5.2.3.
3. Install the brake chamber, ⇒Chapter 5.3.3.
4. Function Test "⇒Chapter 3.3", to ensure that the disc brake is working correctly.
5. Final Procedure, ⇒Chapter 3.4.

5.6 Replacement of Reset Shaft Complete

5.6.1 Initial Procedure

Careful!

Only use SAF special tools where specified!

Read and follow chapter ⇒Chapter 3.2 "Initial Procedure" prior to removing the reset shaft complete.

5.6.2 Remove Reset Shaft Complete

1. If necessary remove dirt, dust and other possible debris from around the reset shaft area. Ensure the area is clean prior to removing the reset shaft protection plug.
2. Remove the reset shaft protection plug (A).
3. Insert SAF special tool P/N 4 434 3885 00 and pull out the reset shaft (B) with x-ring complete, see Fig. 66. The x-ring is always fitted to the reset shaft and never removed.

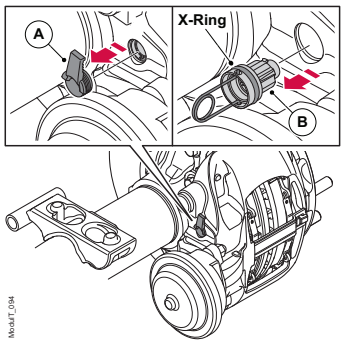

Fig. 66 · Remove the reset shaft

5.6.3 Install Reset Shaft Complete

1. Clean the reset shaft location surfaces in the calliper housing. Ensure the areas are free from dirt, dust, debris, moisture and corrosion.
2. Insert the Torx 55 socket into the new reset shaft and put this into the brake calliper. Whilst doing so make sure the x-ring is correctly in place. The reset shaft complete with x-ring already fitted is supplied ready lubricated, no additional grease or other lubrication is required.
3. Push the reset shaft into position by hand, no impact or high forces are required as they may damage the reset shaft. The resent shaft will click into its position in the centre of the gear wheel when fully engaged. See Fig. 67.

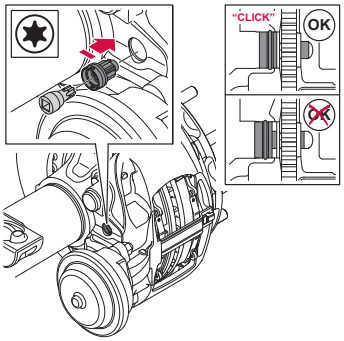

Fig. 67 · Install the reset shaft

5.6.4 Final Procedure

To conclude this procedure read and follow chapters:

1. Function Test "⇒Chapter 3.3", to ensure that the disc brake is working correctly.
2. Final Procedure, ⇒Chapter 3.4.

5.7 Replacement of Disc Brake

5.7.1 Initial Procedure

Read and follow the chapters below prior to removing the disc brake.

1. Initial Procedure, ⇒Chapter 3.2.
2. Remove the brake pads, ⇒Chapter 5.2.2.
3. Remove the brake chamber, ⇒Chapter 5.3.2.

5.7.2 Remove the Disc Brake

Careful!

Do not remove the disc brakes retaining bolts until the brakes weight is supported by the lifting straps!

1. Refit the old pad retainer, by first locating the pad retainer in the housing end in the calliper aperture, then locating the pad retainer slot over the calliper latch, finally slide the pad retainer under the calliper latch until the pad retainer spring pops into locking position. See Fig. 68.

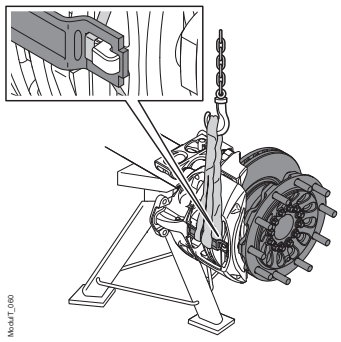

Fig. 68 · Remove the Disc Brake

Careful!

Check that the spring bracket is correctly engaged!

2. Attach a lifting strap around the pad retainer. Tension the lifting strap so taking the full weight of the brake.
3. Remove the retaining bolts holding the disc brake and lift away from the axle.

5.7.3 Install Disc Brake

1. Clean the mating faces of the new disc brakes carrier and axle. Ensure the faces are free from dirt, debris, moisture and corrosion.
2. Fit the old pad retainer spring, then refit the old pad retainer, by first locating the pad retainer in the housing end in the calliper aperture, then locating the pad retainer slot over the calliper latch, finally slide the pad retainer under the calliper latch until the pad retainer spring pops into locking position.

Careful!

Check that the spring bracket is correctly engaged!

3. Attach a lifting strap around the pad retainer and then lift the brake into position.
4. Follow the vehicle/axle manufacturer´s recommendations for fitting/tightening the retaining bolts, or follow the general method described hereafter.
5. Fit and screw home the retaining bolts, alternating from side to side of the carrier.
6. Tighten all retaining bolts to the torque settings defined by the vehicle/axle manufacturers specifications.
7. Remove the lifting strap, old pad retainer and pad retainer spring. Scrap the old pad retainer and pad retainer spring, as they are not to be used again.

5.7.4 Final Procedure

To conclude this procedure read and follow chapters:

1. Install the brake pads, ⇒Chapter 5.2.3.
2. Install the brake chamber, ⇒Chapter 5.3.3.
3. Function Test "⇒Chapter 3.3", to ensure that the disc brake is working correctly.
4. Final Procedure, ⇒Chapter 3.4.

6 Specifications

The SAF SBS 2220 H0 Air Disc Brake comes both left and right-handed, it is important the correct hand is fitted in relation to the normal wheel/disc rotation.

Fig. 69 (see below) shows a general overview of both variants and their relation to the normal wheel/disc rotation (see red arrow), and their leading (AL) and trailing (AT) slide functions.

Each calliper also has a rotation arrow formed on the cast surface where the pad retainer seats on the inboard side, see Fig. 69.

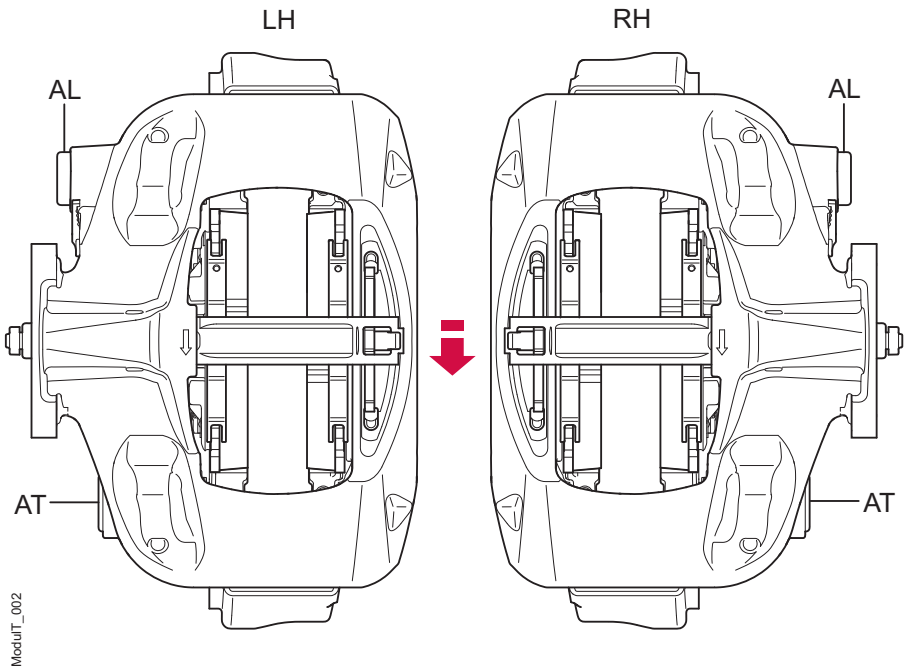

Fig. 69 · SAF SBS 2220 H0 orientation

6.1 Wear Limits

Wear Limits	
Brake Pads, min. lining thickness	2 mm
Brake Pads, max. uneven wear	± 1.5 mm
Brake disc, min. thickness	37 mm

6.2 Tightening Torques

6.2.1 General

Follow the vehicle/axle manufacturers' recommendations.

6.2.2 SAF SBS 2220 H0

Torque	
Screw connection	**Tightening torque [Nm]**
Bolts x2 for slide pins	180 Nm + 70°
Brake chamber fixation nuts	180 ± 20 Nm

7 Tools

7.1 SAF special tool for SBS 2220 H0

The listed tools are part of the SAF Universal Toolbox for disc brakes P/N 3 434 3328 01 or available as an additional set P/N 3 434 3335 00 for the existing SAF Universal Toolbox.

SAF special tool for SBS 2220 H0	
SAF no.	**Designation**
P/N 4 434 3837 00	Threaded spindle TR20 x 2
P/N 4 434 3848 00	Thrust bearing
P/N 4 434 3841 00	Nut TR20 x 2
P/N 4 434 3890 00	Pressure piece SBS 2220 H0

SAF no.	Designation
P/N 4 434 3889 00	Sleeve SBS 2220 H0
P/N 4 434 3884 00	Sleeve SBS 2220 H0
P/N 4 434 3888 00	Right puller SBS 2220 H0
P/N 4 434 3887 00	Left puller SBS 2220 H0
P/N 4 434 3885 00	Mounting clip SBS 2220 H0
P/N 4 434 3886 00	Sleeve SBS 2220 H0

8 Fault Finding

8.1 General fault finding instructions

Danger!

Risk of serious traffic accidents which may lead to serious or fatal injuries.

- Repair work must only be carried out by authorised workshops and by staff with the appropriate training.
- All components which are not in a serviceable condition must be replaced.
- The general safety inspection must be performed as per legal regulations.
- It is the duty of the driver to perform a daily inspection of the vehicle for traffic safety before starting the journey .

8.2 Fault finding/rectification

Danger!

Risk of serious accidents, which may lead to serious or fatal injuries!

- Missing or damaged parts should be replaced immediately by an authorised workshop and by appropriately trained personnel.
- In the case of vehicles with extreme operating conditions, the inspection intervals must be reduced.

Inspection intervals

	Every month or 10,000 km	Every 3 months or 50,000 km	Every 6 months or 100,000 km	Every 2 years or 500,000 km
General safety inspection as per legal regulations.				
Visual inspection				
Connecting hoses	X	–	–	–
Electrical cables	X	–	–	–
Functional test				
Check the control unit for outlet pressure . Prior to initial use.	–	–	X	–
Check the warning light . Prior to initial use.	–	–	X	–
Check pressure pipes through alignment of the system pressure . Prior to initial use.	–	–	X	–

9 Component and Repair Kit List

9.1 Component and Repair Kit List

Spare parts and repair kits for the compressed air disc brake SAF SBS 2220 H0.

Spare parts and repair kits

Fig. 70, item no.:	Quantity	Designation	Order no.
059	1	**Left brake calliper group SBS 2220 H0**	**3080008100**
060	1	**Right brake calliper group SBS 2220 H0**	**3080008200**
064		**Brake pad kit 22.5" - Items 63.1, 63.2 ,64.1, 64.2**	**03057009600**
63.1	2	Pad retainer spring bracket SBS 2220	cannot be ordered individually
63.2	2	Securing clip SBS 2220	cannot be ordered individually
64.1	4	Brake pad 22.5"	cannot be ordered individually
64.2	4	Spring clip	cannot be ordered individually
065		**Reset shaft group - Items 65, 65.1**	**03434386200**
65	1	Adjuster plugs	cannot be ordered individually
65.1	1	Adjustment screw	cannot be ordered individually
066		**Seal kit pressure piece**	**03434386300**
068		**Wear indicator kit**	**03424203300**
68.1	2	Brake pad wear indicator	cannot be ordered individually
68.2	2	Mounting plate	cannot be ordered individually
70		**Guide and seal kit**	**03434386100**
70.1	2	Torx screw	cannot be ordered individually
70.2	1	guide pin	cannot be ordered individually
70.3	2	Bearing	cannot be ordered individually
70.4	1	Protective cup	cannot be ordered individually
70.5	1	Slide bearing	cannot be ordered individually
80.3	1	Bushing	cannot be ordered individually
80.4	2	Bellows	cannot be ordered individually
81.2	1	guide pin	cannot be ordered individually
83.1	1	Protective cup	cannot be ordered individually

Spare parts overview

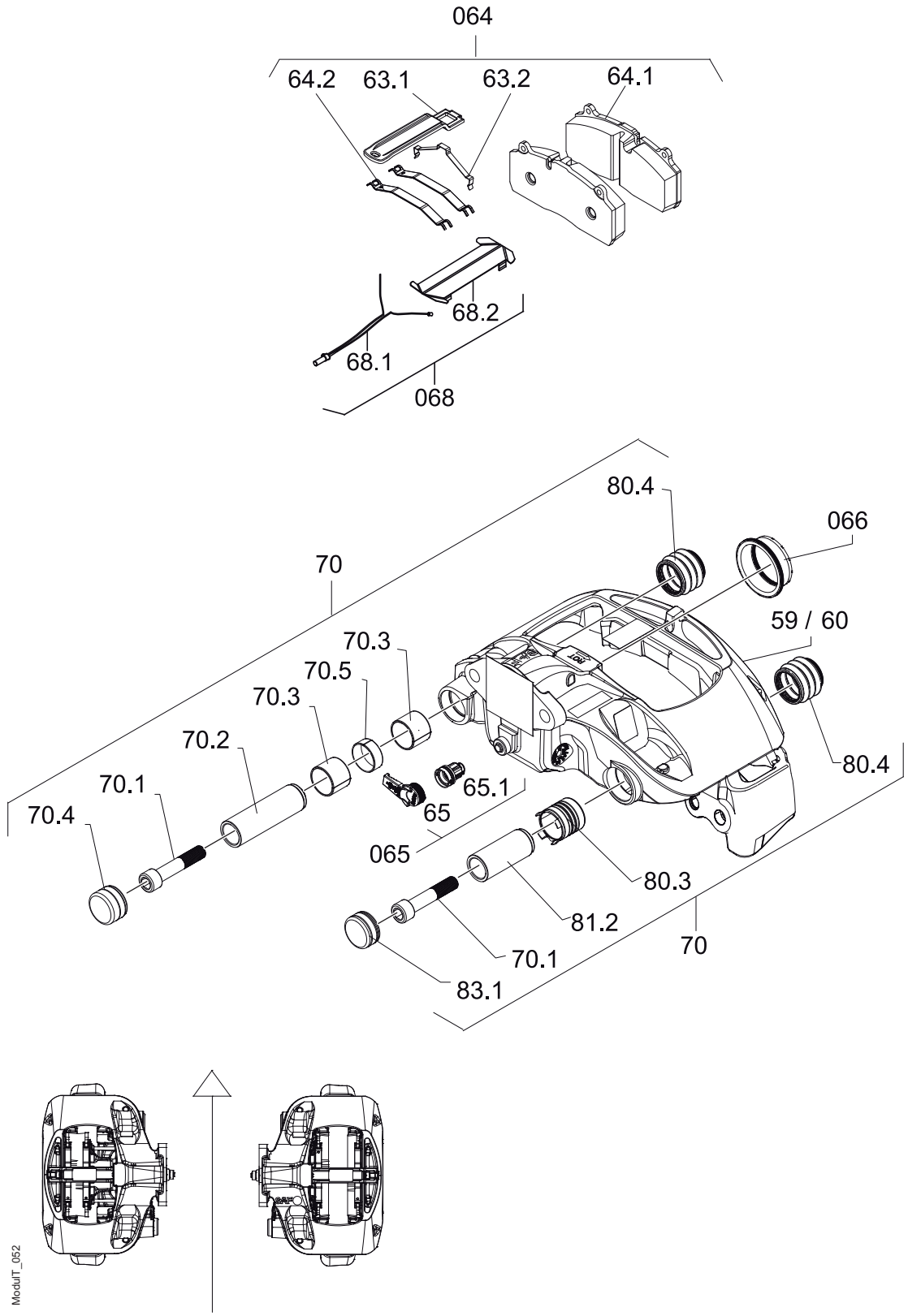

Fig. 70 · Spare parts illustration

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